

The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HISAO HAYASHI, MASAHIRO FUJINO,
YASUSHI SHIMOGAICHI, and MAKOTO TAKATOKU

Appeal 2007-0665
Application 09/772,986
Technology Center 2800

Decided: June 28, 2007

Before JOSEPH F. RUGGIERO, LANCE LEONARD BARRY, and
HOWARD B. BLANKENSHIP, *Administrative Patent Judges*.

RUGGIERO, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the Final Rejection of claims 1-8 and 13-16. Claims 9-12 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part and enter a new rejection pursuant to 37 C.F.R. § 41.50(b).

Appellants' invention relates to a thin film semiconductor device formed as integrated circuits on an insulating substrate with bottom gate structured thin film transistors. The bottom gate structure has a gate electrode, a gate insulating film, and a semiconductor thin film stacked in the order from below upward. The gate electrode is made of metallic material having a thickness of less than 100nm while the gate insulating film has a thickness greater than the thickness of the gate electrode. (Specification 6-8).

Claim 1 is illustrative of the invention and reads as follows:

1. A thin film semiconductor device comprising:

an insulating substrate; and

a thin film transistor formed on said insulating substrate, wherein

said thin film transistor is formed in a bottom gate structure having gate electrode, a gate insulating film, and a semiconductor thin film stacked in the order from below upward, and

said gate electrode is made of metallic material having a thickness of less than 100nm;

said gate insulating film has a thickness that is greater than said thickness of said gate electrode.

The Examiner relies on the following prior art reference to show unpatentability:

Hisao (as translated)
(Published Japanese Patent Application)

JP 10-209467

Aug. 7, 1998

Claims 1-8, 13, and 15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hisao. Claims 14 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hisao.

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the Briefs and Answer for the respective details. Only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants could have made but chose not to make in the Briefs have not been considered and are deemed waived [see 37 C.F.R. § 41.37(c)(1)(vii)].

ISSUES

- (1) Under 35 U.S.C § 102(b), with respect to appealed claims 1-8, 13, and 15, does Hisao have a disclosure which anticipates the claimed invention? Specifically, does Hisao disclose a thin film semiconductor device with a metallic material gate electrode having a thickness of less than 100nm?
- (2) Under 35 U.S.C § 103(a), with respect to appealed claims 14-16, has the Examiner established a prima facie case of obviousness based on the disclosure of Hisao?

PRINCIPLES OF LAW

1. ANTICIPATION

It is axiomatic that anticipation of a claim under § 102 can be found if the prior art reference discloses every element of the claim. *See In re King*, 801 F.2d 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986) and *Lindemann*

Maschinenfabrik GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 1458, 221 USPQ 481, 485 (Fed. Cir. 1984).

In rejecting claims under 35 U.S.C. § 102, a single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation. *Perricone v. Medicis Pharmaceutical Corp.*, 432 F.3d 1368, 1375-76, 77 USPQ2d 1321, 1325-26 (Fed. Cir. 2005), (citing *Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 1565, 24 USPQ2d 1321, 1326 (Fed. Cir. 1992)).

Anticipation of a patent claim requires a finding that the claim at issue “reads on” a prior art reference. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed Cir. 1999) (“In other words, if granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether it also covers subject matter not in the prior art”) (internal citations omitted).

2. OBVIOUSNESS

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). “[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability.” *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). Furthermore, ““there must be some articulated reasoning with some rational underpinning to support the legal conclusion of

obviousness' . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)).

ANALYSIS

35 U.S.C. § 102(b) REJECTION

In addressing the language of independent claims 1 and 5, the Examiner finds that Hisao discloses a thin film semiconductor device having an upper layer gate electrode with a thickness of about 50-300 nm and a lower gate electrode with a thickness of 50-200 nm. According to the Examiner (Answer 3), Hisao's two gate layers taken together have a combined thickness of about 100-500 nm allowing for a lower limit value of slightly above or less than 100 nm, thereby meeting the claimed requirements.

Appellants' arguments in response assert that the Examiner has not shown how each of the claimed features is present in the disclosure of Hisao so as to establish a case of anticipation. Appellants' arguments (Br. 7; Reply Br. 3) focus on the contention that the 100nm lower limit of Hisao's gate electrode thickness range does not satisfy the requirements of claims 1 and 5 which require a gate thickness of less than 100 nm.

After reviewing the disclosure of Hisao in light of the arguments of record, we are in general agreement with Appellants' position as stated in the Briefs. Our interpretation of the disclosure of Hisao coincides with that

of Appellants, i.e., there is no disclosure, expressly or inherently, of a thin film semiconductor device with a gate electrode having a thickness of less than 100 nm as claimed.

We do not disagree with the Examiner that Hisao's disclosure of a range lower limit combined gate thickness of about 100 nm could be reasonably interpreted as "allowing" for thicknesses slightly above or below 100 nm, i.e., a value which would overlap the claimed range of "less than 100 nm." *See In re Woodruff*, 919 F.2d 1575, 1577, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Since there are no specific examples disclosed in Hisao of gate thicknesses less than 100 nm, however, the appealed claims would be anticipated only if the claimed subject matter were disclosed in Hisao "with sufficient specificity to constitute an anticipation under the statute." *See Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999, 78 USPQ2d 1417, 1423 (Fed. Cir. 2006). In our view, Hisao's disclosed combined gate thickness range of 100-500 nm, with no specific gate thickness examples of less than 100 nm, does not describe the claimed gate thickness feature of "less than 100 nm" with sufficient specificity to form a basis for a rejection based on anticipation.

In view of the above discussion, since all of the claim limitations are not present in the disclosure of Hisao, we do not sustain the Examiner's 35 U.S.C. § 102(b) rejection of independent claims 1 and 5, nor of claims 2-4, 6-8, 13, and 15 dependent thereon.

35 U.S.C § 103(a) REJECTION

With respect to the Examiner's obviousness rejection of claims 14 and 16 based on the teachings of Hisao, Appellants' arguments in response assert a failure to set forth a prima facie case of obviousness since all of the claim limitations are not taught or suggested by the Hisao reference. In particular, Appellants contend (Br. 7-9; Reply Br. 3) that Hisao does not disclose a thin film semiconductor device having a gate electrode with a thickness of 90 nm. Further, Appellants argue that the Examiner has provided no evidentiary support for the conclusion that it would have been obvious to the ordinarily skilled artisan to form the gate electrode of Hisao with a thickness of 90 nm.

Our review of the arguments of record, however, finds us in agreement with the Examiner's position as stated in the Answer. We initially note that, while we found Hisao's gate thickness disclosure of "about 100 nm" to not be anticipatory of a claim limitation reciting "less than 100 nm," we did find that the language "about 100 nm" allows for values slightly below 100 nm. Accordingly, a prima facie case of obviousness is established for claimed values of "less than 100 nm" since Hisao's disclosed combined gate thickness range of 100-500 nm overlaps the claimed range in view of the fact that the lower limit of the range can be slightly below 100 nm. (*Woodruff*, 919 F.2d at 1577, 16 USPQ2d at 1936).

As to the question of the obviousness of particular values of gate thickness below 100 nm, such as the claimed 90 nm, we find no error in the Examiner's conclusion, based on the teachings of Hisao, that it would have been "obvious to make the gate thickness as small as possible by selecting a gate thickness of 90 nm since the gate thickness is [sic, a] variable of

importance subject to routine experimentation and optimization.” (Answer 7). “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Further, although Appellants’ arguments point to their drawing Figures 3 and 4 in support of their position, we find no evidence of criticality of the claimed gate thickness value of 90 nm or, for that matter, of any particular value below 100 nm. Accordingly, since it is our opinion that the Examiner’s prima facie case of obviousness has not been overcome by any convincing arguments from Appellants, the Examiner’s 35 U.S.C. § 103(a) rejection, based on Hisao, of dependent claims 14 and 16, is sustained.

REJECTION UNDER 37 C.F.R. § 41.50(b)

We make the following new ground of rejection using our authority under 37 C.F.R. § 41.50(b).

Claims 1-8, 13, and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hisao. With respect to claims 1-8, 13, and 15, Hisao discloses a thin film semiconductor display device having an insulating substrate 1, pixels 14 in matrix form, and thin film transistors 3 with a bottom gate structure. This bottom gate structure has a gate electrode 5, a gate insulating film 4 and a polycrystalline thin film 2 stacked in the order from below upward. The gate electrode 5, constructed of an upper layer 5a with low thermal conductivity and a lower layer 5b with high thermal conductivity, has a combined gate thickness of about 100-500 nm (Hisao, ¶ 0012) which overlaps the claimed range of “less than 100 nm” since the

lower limit range value of “about 100 nm” allows for values slightly below 100 nm. Hisao also discloses that the gate insulating film 4 has a thickness in the range of 100-200 nm which overlaps the claimed range of “greater than 100 nm.” In situations where claimed ranges overlap the ranges disclosed in the prior art, a prima facie case of obviousness is established. *See Woodruff*, 919 F.2d at 1577, 16 USPQ2d at 1936, and *In re Wertheim*, 541 F.2d 257, 271, 191 USPQ 90, 103-04 (CCPA 1976).

CONCLUSION

In view of the foregoing, we reverse the Examiner’s 35 U.S.C. § 102(b) rejection of claims 1-8, 13, and 15, but we sustain the 35 U.S.C. § 103(a) rejection of claims 14 and 16. A new rejection of claims 1-8, 13, and 15 under 35 U.S.C. § 103(a) is entered pursuant to 37 C.F.R. § 41.50(b). 37 C.F.R. § 41.50(b) provides [a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.

37 C.F.R. § 41.50(b) also provides that the Appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) *Reopen prosecution*. Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner....

(2) *Request rehearing*. Request that the proceeding be reheard under § 41.52 by the Board upon the same record....

Appeal 2007-0665
Application 09/772,986

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART
37 C.F.R. § 41.50(b)

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